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FRANCIS BAILY, Esq., President, in the Chair.

Edward Turst Carver, Esq. was balloted for, and duly elected a Fellow of the Society.

The following communications were read :

I. On a Self-acting Circular Dividing Engine. By W. Simms, Esq.

The original graduation of a circle, notwithstanding the great improvements in the method invented by Mr. Troughton, is still attended with very great difficulties, requiring not only the greatest care on the part of the operator, but tending to injure his health by the labours required in it, and thus not admitting of frequent repetition. The necessary cost of an instrument produced by such an amount of severe labour is also another very serious objection. The author had long been of opinion, that, to copy the divisions of a circle which had been graduated with extraordinary care, upon work of smaller dimensions, would, in general, be more satisfactory than original graduation. The latter process consists of several successive steps, in either or all of which a certain amount of error may escape detection, which in general may go far to balance one another, although there will be parts in almost every work where errors appear arising from an accumulation of those minute quantities.

The author had long since determined, as soon as he could obtain sufficient leisure, to construct an engine sufficiently large for the graduation of all circles, excepting those of the largest class, and the object of this paper is to lay before the Society a brief notice of the successful termination of the work.

The engine, in general arrangement and construction, is similar to that made by Mr. Edward Troughton, in the author's possession, though there are several additions and peculiarities which are pointed out by him. The circle or engine-plate is of gun-metal, 46 inches in diameter, and was cast in one entire piece by Messrs. Maudslay and Field, teeth being ratched upon its edge. The centre of the engine-plate is so arranged that it can be entered by the axis of the instrument to be divided, and the work by this means brought down to bear upon the surface of the engine-plate, which arrangement prevents the necessity of separating the part

intended to receive the divisions from its axis, &c.—a process both troublesome and dangerous.

Upon the surface, and not far from the edge of the engine-plate, are two sets of divisions to spaces of five minutes, one set being in silver and the other strongly cut upon the gun-metal face. There are also as many teeth upon the edge as there are divisions upon the face of the engine-plate, namely, 4320, and consequently one revolution of the endless screw moves through a space of five minutes. The silver ring was divided according to Troughton's method with some slight variations. In this operation it seemed to the author the safer course to divide the circle completely, and then to use a single cutter for ratching the edge; and he believes that the teeth upon the edge have been cut as truly as the original divisions themselves.

Another very important arrangement is, that the engine is self-acting and requires no personal exertion or superintendence, nothing being necessary but the winding up of the machine, or rather the raising of a weight which, by its descent, communicates motion to the dividing engine. The machinery is so arranged that it can be used or dispensed with at pleasure, there being some cases in which a superintending hand is desirable.

The author then proceeds with a description of the machinery, as represented in the drawings accompanying his paper, and draws particular attention to the contrivance by which the engine can discharge itself from action when it has completed its work.

He concludes by observing that, as the machinery is simple, by no means expensive, can be made by an ordinary workman, is adapted to all the engines now in existence, which are moved by an endless screw, as it lessens the labour of the artist and increases the accuracy of the graduated instrument, he trusts his communication will prove acceptable to all who are interested about such matters.

II. Recomputation of Roy's Triangulation for connecting the Observatories of Greenwich and Paris. By W. Galbraith, Esq.

The author considers from internal evidence that Roy's measurement of the base on Hounslow Heath was in his own scale, and that of Mudge in Ramsden's scale, and he has used in his calculations the mean of these in imperial measure, reduced to the mean level of the sea. He has also availed himself of the New Survey of France to obtain such data as it afforded to connect the two countries.

Some of the most important of the results are as follows:—Assuming the latitude of Greenwich to be $51^{\circ} 28' 38'' \cdot 50$ N., and the compression of the earth to be $\frac{1}{300}$, there results for

Calais	Lat. $50^{\circ} 57' 27'' \cdot 67$ N.; Long. $1^{\circ} 51' 17'' \cdot 30$ E.
Dunkirk	Lat. $51^{\circ} 2' 6'' \cdot 68$ N.; Long. $2^{\circ} 22' 39'' \cdot 72$ E.

Again, assuming from the new *Description Géométrique de la*

France, the long. of Calais to be $29^{\circ} 0' 40''$ West of Paris, and that of Dunkirk, $2^{\circ} 22' 66''$ East of Paris,

The Long. of Paris by comparison with Dunkirk is..... $2^{\circ} 20' 17''.70$ E.

Calais $2^{\circ} 20' 17''.06$

Calais, from Kater's New Survey $2^{\circ} 20' 19''.13$

The Mean of which in Time is..... $0^h 9^m 21^s.20$ E.

Mr. Dent's Result by Chronometers was $0^h 9^m 21''.21$

And Sir J. Herschel's by fire signals $0^h 9^m 21''.46$

III. Occultations of Fixed Stars and the Planet *Jupiter* by the Moon. Observed at Hamburg by C. Rumker, Esq.

				h	m	s	
1842.	July 26	15 Piscium	Em.	11	35	47.0	Hamb. M. T.
—	30	μ Arietis	Em.	13	12	34.6	
Sept.	26	B Tauri	Em.	11	20	19.7	
Nov.	7	Jupiter { First contact		4	32	0.1	
		Complete Im.		4	33	27.1	
—	8	σ Capricorni	Em.	5	23	44.0	
Dec.	14	47 Arietis	Im.	5	41	0.7	
1843.	Mar. 6	47 Arietis	Im.	8	11	52.1	
—	8	95 Tauri	Im.	7	48	56.2	
—	20	i Scorpii.....	{ Im.	15	16	38.3	
			{ Em.	15	50	52.4	
Apr.	10	16 Sextantis	Im.	13	6	54.28	
—	12	*	Im.	8	54	2.18	
May	3	3 Geminorum	Im.	9	41	29.9	
		4 Geminorum	Im.	9	57	32.7	

IV. The following communications concerning the Great Comet of 1843:—

1. Notes on its Appearance made during a Voyage from the Cape of Good Hope to England. By M. Close, Esq. Commander of the Ship *Ellenborough*.

It was first seen on the evening of the 4th of March, and before the discovery of the nucleus on the same evening was taken for a lunar iris. The nucleus was on this evening estimated to be of equal brightness with a star of the second or third magnitude, and the length of its tail $32^{\circ} 30'$. The tail had a darkish line from its nucleus through the centre to the end. Stars of the third magnitude were visible through the broadest part, but not near the nucleus. It was seen on several evenings, the last time being on the evening of the 31st of March; it was occasionally brilliant enough to throw a strong light on the sea. The greatest length of tail estimated was on the 19th of March, it being then $43^{\circ} 30'$, and it was observed to have considerable curvature. The account was accompanied by a small sketch of its appearance on the 5th of March.

2. A Letter from John Belam, Esq. Master of H. M. Sloop *Albatross*, on the Great Comet of 1843. Communicated by G. B. Airy, Esq. Astronomer Royal.

“On the 2d of March, in latitude $18^{\circ} 33' 18''$ N. and longitude $72^{\circ} 17' 0''$ West of Greenwich, a meteor made its appearance in

the western quarter of the heavens of a whitish colour. It became brighter each succeeding evening, and on the 7th we obtained the following observations:—In form it is like an elongated birch rod, slightly curved; the head or commencement of it being nearest the horizon at an altitude of about 19° , the tail pointing in the direction of *Sirius*, and measuring from the head 28° . That part of it from which the tail is produced is of a reddish appearance, but no star is visible through a common telescope.

Greenwich Mean Time.

March 7 $\begin{smallmatrix} h & m & s \\ 11 & 54 & 56 \\ 11 & 56 & 33 \end{smallmatrix}$

Observed Distance between

The Comet and *Sirius*..... $\begin{smallmatrix} 83^\circ & 12' & 10'' \\ \alpha \text{ Canopus} & 75 & 25 & 40 \end{smallmatrix}$

Observed Azimuth South, $79^\circ 10'$.

Greenwich Mean Time.

March 13 $\begin{smallmatrix} h & m & s \\ 11 & 52 & 46 \\ 11 & 54 & 46 \\ 11 & 55 & 46 \end{smallmatrix}$

Observed Distance between

The Comet and α Canopus $\begin{smallmatrix} 66^\circ & 55' & 10'' \\ \text{Sirius} & 67 & 1 & 40 \\ \text{Aldebaran} & 44 & 26 & 30 \end{smallmatrix}$

Its altitude appears to be about 23° ; its azimuth (observed), South, $79^\circ 11'$.

“It shewed brightest on the 7th instant, and since then to the 13th it has gradually become fainter.

“Since its appearance the generative point has been surrounded by a misty haze, from which cause the observations could not be taken with any great precision.

“*H. M. Sloop Albatross, Port au Prince, St. Domingo, 14th March, 1843.*”

3. Observations of the Comet by Mr. S. C. Walker and Professor Kendall, at the Observatory of the High School at Philadelphia. Communicated by Lieut.-Col. Sabine.

The comet was observed with the 9-feet Fraunhofer equatoreal, and the observations are cleared of the effects of differences of refraction, but not of the effects of parallax and aberration. Latitude of the Observatory, $39^\circ 57' 8''$; longitude, $5^h 0^m 41^s \cdot 9$.

Date of Observation Sidereal Time.	Apparent Right Ascension.	Sidereal Time.	Apparent Declination.
March $\begin{smallmatrix} d & h & m & s \\ 19 & 7 & 32 & 6 \cdot 7 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 2 & 57 & 24 \cdot 06 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 7 & 32 & 6 \cdot 7 \end{smallmatrix}$	$-9^\circ 27' 36'' \cdot 5$
22 $\begin{smallmatrix} h & m & s \\ 7 & 48 & 45 \cdot 3 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 3 & 17 & 43 \cdot 34 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 7 & 44 & 49 \cdot 2 \end{smallmatrix}$	$-8^\circ 36' 3 \cdot 4$
23 $\begin{smallmatrix} h & m & s \\ 7 & 40 & 33 \cdot 7 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 3 & 23 & 43 \cdot 97 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 7 & 40 & 50 \cdot 1 \end{smallmatrix}$	$-8^\circ 19' 20 \cdot 8$
24 $\begin{smallmatrix} h & m & s \\ 7 & 35 & 52 \cdot 5 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 3 & 29 & 36 \cdot 28 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 7 & 46 & 32 \cdot 9 \end{smallmatrix}$	$-8^\circ 3' 33 \cdot 0$
26 $\begin{smallmatrix} h & m & s \\ 7 & 57 & 24 \cdot 3 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 3 & 40 & 30 \cdot 54 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 8 & 6 & 54 \cdot 5 \end{smallmatrix}$	$-7^\circ 32' 32 \cdot 2$
29 $\begin{smallmatrix} h & m & s \\ 8 & 11 & 35 \cdot 1 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 3 & 54 & 14 \cdot 26 \end{smallmatrix}$	$\begin{smallmatrix} h & m & s \\ 8 & 14 & 10 \cdot 0 \end{smallmatrix}$	$-6^\circ 50' 3 \cdot 1$

The observations of the 19th, 22d, and 24th, by computations,

made by the same gentlemen, give the following approximate elements.

Perihelion Passage, Feb. 26 0489, mean time Philadelphia.

Ascending Node.....	166° 1' 25"
Inclination	39 0 22
Longitude of Perihelion ...	292 50 31
Perihelion Distance	0.00834
Motion direct.	

4. Notes on the Comet, accompanied by a Pencil Sketch, by Captain Hopkins, commanding the East India Company's Ship, *Seringapatam*, on a voyage from the Cape of Good Hope. Communicated by Sir John Herschel.

The comet was seen first on the 2d of March, but indistinctly. A good view of it was obtained on March 4, when it was very brilliant. Its tail appeared separated through half its length by a dark line, and was, by rough measurement, found to be about 30° in length. After this it decreased in brightness, and was not seen longer than the 7th of April.

5. Extract of a Letter, dated St. Kitt's, 6th of March, 1843, from Lieut. D. W. Tyler, R. E.

6. Letter from J. T. Austin, Esq., dated Funchal, Madeira, April 8, 1843, accompanying a sketch of the Comet. Communicated by Sir John Herschel.

7. Notes on the Comet as seen by M. Montojo, at San Fernando. Communicated by Sir John Herschel.

The tail of the comet was first seen on the 6th of March; the nucleus was compared roughly with two small stars seen in the same field with it on the 13th; on the 14th and 15th some observations were obtained with an altitude and azimuth instrument, and it was compared with some known stars; the nucleus was not seen after the 1st of April.

8. An Account of the Comet as seen on board the ship *Childe Harold* on her voyage from Bombay to London. By Lieut. W. S. Jacob, R. E.

The tail was first seen on the 3d of March, but a good view of it was not obtained till the 9th. On this evening, the nucleus seen in a night telescope appeared like a star of the sixth magnitude, and the following distances from α *Eridani* and α *Orionis* were measured with a sextant:

Time by watch

h m			
8	15	46° 11'	} Distance from α <i>Eridani</i> .
	16	12	
	25	8	
	26	10	
	18	56 35	} Distance from α <i>Orionis</i> .
	19	34	
	21	34	
	23	34	

Watch fast on Greenwich mean time (by estimated longitude) 39°.0.
The length of the tail 36°.

From the above observations Mr. Jacob infers the following place of the comet :

At 7^h 42^m Gr. M.T. R.A. = 1^h 17^m 9^s Decl. = - 11° 59'.

The nucleus was last seen on the 5th of April.

9. Letter from T. Forster, Esq., dated Bruges, April 22, 1843.

Dr. Forster, with a view of drawing attention to the phenomena observed by him on the 20th of March in connexion with the comet, had accurately represented in a coloured drawing the appearance of the comet and of the surrounding sky, and had caused it to be copied by an artist, with the intention of presenting the same to the Society. The drawing has since been received, and is now in the possession of the Society.

10. An Account of the Comet as seen on board the ship Malabar on her passage from the Cape of Good Hope. By R. Pollock, Esq. Commander.

The comet was first seen on the 2d of March. On the 5th the nucleus was well seen, and appeared as a star of the fourth magnitude; the length of tail was 23°.

The following measures of the distance of the nucleus and bright stars were made :

	^h	^m					
March 10	7	0	Dist. from	Regulus	53° 20' 0"	} Long. 7 22 W.	
	7	35		Sirius...	74 33 30		
	7	40		Canopus	70 6 0		
11	7	35		Sirius...	71 41 0	} Long. 9 50 W.	
	7	40		Canopus	68 47 0		
13	7	35		Sirius...	67 0 0		
	7	40		Canopus	69 30 0		
14	No observations.....					Long. 15 55 W.	

11. Letter from H. A. Cowper, Esq., H. M. Consul at Pernambuco in Brasil, dated 9th March, 1843.

The comet was seen first on March 1; and on the 4th Mr. Cowper saw the nucleus very distinctly, and makes the following remarks on its appearance :

"It is particularly small, without any nebulosity, but of extreme brightness, of a golden hue, and a line of the same bright colour may be distinctly traced running directly from it into the tail for 4° or 5°: the tail is perhaps 30° in length, and is of a brilliant silver colour, perfectly opaque, but becoming less and less dense until it is lost in space."

Mr. Cowper adds the following observations, made with a sextant on March 9, at his request, by a master of a merchant vessel :

Bearing of Nucleus	W. 7° 45' S.
Altitude of ditto...	9 0
Length of tail	28 0

Breadth of tail at two-thirds of its length from the nucleus 1°.

12. Observations made at the Royal Observatory, Cape of

Good Hope, by Piazzzi Smyth, Esq. Communicated by Sir J. F. W. Herschel, Bart.

The nucleus of the comet was first seen on the 3d March, but it set about ten minutes after its discovery. It was looked at with the 46-inch achromatic telescope, and an approximate observation was attempted, by leaving the telescope fixed, and measuring, the next morning, the azimuth and altitude of the point where it set.

The nucleus seemed to consist of a planetary disk from which rays emerged in the direction of the tail. To the naked eye there appeared a double tail about 25° in length, the two streamers making with each other an angle of about $15'$, and proceeding from the head in perfectly straight lines. From the end of the forked tail, and on the north side of it, a streamer diverged at an angle of 6° or 7° towards the north, and reached a distance of upwards of 65° from the comet's head; a star (probably τ Ceti) was near the end of this appendage: a similar, though much fainter, streamer was thought to turn off south of the line of direction of the tail.

On the 4th of March Mr. Smyth, accompanied by some friends, went to the Lion's Rump signal station, where the comet would set in a sea horizon, and several distances were taken with sextants and a reflecting circle. These not being reduced sufficiently are not inserted here.

On the 5th, the comet was seen, and several sextant observations were made. The appearance of the comet on this evening appeared considerably changed; the angle of the north streamer with the direction of the tail had been diminishing and was now south; it had also diminished in brightness. The total length was about 35° . All the rays proceeding from the head were now of uniform brightness, excepting one bright streak, which could be traced along the tail.

Though the observatory is very deficient in extra-meridional apparatus, Mr. Smyth succeeded, on March 6, by various expedients in obtaining several comparative measures of the nucleus and neighbouring stars, of which the unreduced observations only are given. On this evening he makes the following remarks respecting the appearance of the comet: "The nucleus is now the broadest part of that end of the comet; all the rays come from the posterior side, and are pretty equal in brightness, with the exception of a narrow bright streak in the middle, which runs for 3° or 4° along the middle of the tail, and then verges to the north side." The tail this evening was about 27° long. Several sextant observations of distance were made this day.

On the 8th, several differential observations were made.

On the 9th, some good differential observations and some sextant observations were made. The angle of the two sides of the tail at the head appeared to have undergone a gradual diminution, and the middle part was becoming more and more equal in brightness to the sides.

The paper contains also some observations of Laugier's Comet, and some observations of occultations of stars by the moon.

13. Abstract, by the Secretary, of Newspaper Accounts of the Comet which have been forwarded to the Society.

Some of these accounts are of considerable interest, and Mr. Main thought it desirable to collect and to bring them before the Society, which will thus be in possession of almost every thing that has been published relatively to the comet.

The first is extracted from a newspaper of Tobago, and is signed M. Dill, Lieutenant Royal Engineers, Superintendent of Signals, and dated Fort King George, 8th March, 1843.

"During the last few days, our island has been visited by a very large and brilliant comet. It is said to have been seen first on Friday evening, but was more generally observed on Saturday, when it presented a most luminous appearance; the nucleus of the comet being, at about $\frac{1}{4}$ to 7 o'clock, in the direction of south-west, and the tail stretching to an immense length across the heavens in a south-east direction, and in opposition to the sun's light. On Sunday night, it was observed by compass, when the nucleus bore west $25^{\circ} 0'$ south, at $\frac{1}{4}$ to 7 o'clock. On Monday, an observation was taken with a theodolite at $16^{\text{m}} \frac{1}{4}$ past 7 o'clock, when the nucleus bore west $16^{\circ} 7'$ south, with an elevation of $6^{\circ} 4'$, and the end of the tail, as nearly as it could be caught, bore west $28^{\circ} 14'$ south, with an elevation of $28^{\circ} 21'$."

Similar observations were made of it on the following Tuesday and Wednesday.

The following letter, from Mr. Benjamin Pierce, dated Cambridge, March 31, 1843, appeared in the *Boston Courier* of April 1, 1843:—

"The elements of the comet's orbit, which I send you, are roughly computed, and will need future correction. They agree very closely with Mr. Clarke's noonday observations of February 28, and were computed from Mr. Bond's observations of March 11, 18, 24, and 26. More correct calculations, in which all the observations will be thoroughly discussed, will in due time be presented to the American Academy.

Long. of the Ascending Node	348° 33'
Inclination	39 16
Long. of the Perihelion.....	280 31
Perihelion Distance	0.00872

Time of Perihelion Passage, Feb. 27^d.01, mean time at Cambridge.
Motion retrograde.

In another American paper was the following account:—

"A comet of unusual size and brilliancy was distinctly visible to the naked eye in this vicinity on Tuesday last, the 28th of February, 1843, at noonday, at a distance, as we should judge, of 5° or 6° east from the sun. It extended over a space in the heavens of nearly 3° in length, with little more than 1° in width, and appeared like a very small white cloud, with its nucleus, or densest part, towards the sun, and its luminous train in opposition to it. On

viewing it through a common telescope of moderate power, it presented a distinct and beautiful appearance, exhibiting a very white and bright nucleus, and a tail dividing near the nucleus into two separate branches, with the outer sides of each branch convex, and of nearly equal length, apparently 8° or 10° , and a space between their extremities of 5° or 6° . Though viewed several minutes under these favourable circumstances, no coruscations were perceived."

The above American accounts were communicated to the Astronomer Royal by Mr. J. Cranch, at the request of Mr. Bond, of the Cambridge Observatory, near Boston.

In an article by M. Plana, extracted from the *Gazetta Piemontese* of the 4th of April, are the following parabolic elements of the comet:—

Perihelion Passage, 1843, Feb. 27.652, Munich mean time.

Perihelion Distance	0.0056343
Long. of the Perihelion	$189^\circ 51' 25''$
Inclination.....	$40^\circ 29' 37''$
Long. of the Ascending Node.....	$353^\circ 0' 59''$
Motion retrograde.	

The following observations and elements of the comet, given by M. Carlini, Director of the Royal Observatory of Milan, are extracted from an Italian Gazette:—

1843.	Mean Time.	R. A.	Declination.	Longitude.	Latitude.
March 19	^h 7 ^m 37	$43^\circ 33'$	$-9^\circ 31'$	$1^\circ 8' 18''$	$-25^\circ 5'$
29	8 14	$58^\circ 30'$	$-6^\circ 52'$	$1^\circ 24' 34''$	$-26^\circ 32'$
30	8 14	$59^\circ 38'$	$-6^\circ 38'$	$1^\circ 25' 51''$	$-26^\circ 33'$

The above observations, together with one made at Munich on the 23d of March, and another made at Padua on the 24th, furnished the following elements:—

Perihelion Passage, Feb. 27, 5^h mean time of Milan.

Perihelion Distance	0.1542
Long. of the Perihelion	$243^\circ 33'$
Long. of the Node	$353^\circ 45'$
Inclination	$38^\circ 0'$
Motion retrograde.	

In the *Guiana Herald* (city of Georgetown) of March 30, 1843, appeared a notice of the comet, dated Demerara, March 25, and signed J. Bamber, with observations of its distance from neighbouring bright stars; the most important of which are as follow:—

Saturday, March 18, at 7^h 14^m, the nucleus was brilliant; the coma, body, and tail, very transparent:

At 7 ^h 23 ^m	Sirius and the Nucleus, Apparent Distance	55° 56' 0"
7 28	γ Orionis ——— ———	40 16 7
7 45	Aldebaran ——— ———	35 11 0

" Saturday, March 19. Appearance as before. The evening was beautiful.

At 7 ^h 7 ^m	α Orionis and Nucleus, Apparent Distance	47° 0' 0"
7 11	γ Orionis ——— ———	38 14 0
7 14	Rigel ——— ———	32 32 9
7 17	Aldebaran ——— ———	32 2 0
7 22	Sirius ——— ———	55 9 0

" Sunday, March 29:

At 7 ^h 5 ^m	Rigel and Nucleus, Apparent Distance	26° 56' 30"
7 11	α Orionis ——— ———	38 4 0
7 22	Sirius ——— ———	45 13 0
7 33	Aldebaran ——— ———	26 32 0
7 57	Sirius ——— ———	44 25 0

" Monday 27th. The nucleus very faint, as also the body and tail.

At 7 ^h 33 ^m	Rigel and Nucleus, Apparent Distance	21° 0' 0"
8 3	Procyon ——— ———	52 50 0

It appears that the comet was first seen in this colony on March 3.

The newspaper containing the above account was received by the Astronomer Royal, and communicated to the Society by him.

An article by M. Capocci, on the comet, of which the following is an abstract, is extracted from the *Giornale della duc Sicilie*, of 1st May, 1843, and communicated by Colonel Jackson.

The article gives an account of a paper read by M. Capocci before the Royal Academy of Sciences of Naples. M. Capocci first corrects a mistake into which some observers appear to have fallen, in over-estimating the length of the tail, to which some persons attributed an extent of 80° to 90°, but which certainly was not visible beyond 40° to 45° from the nucleus. With respect to the difficulty attending the orbit of the comet, he attributes it to the very small perihelion distance, and the consequently very rapid angular motion at the passage through the perihelion; the comet, during the eighteen days following its perihelion passage (that is, prior to the time of its first observation on March 17), having gone through at least 170° of its angular motion round the sun; while, during the whole of the time of its visibility afterwards, it described only 3°, from which the orbit was to be determined; whence it has happened that astronomers of very high reputation have published results altogether false. With respect to the particular difficulty attending the circumstance of some of

the sets of observations having given a perihelion distance smaller than the sun's semi-diameter, and the apparent consequence that the comet must thus either have passed within the luminous matter of the sun, or have been projected obliquely from his surface, M. Capocci considers that it is more seeming than real, as an error sufficient to account for such a paradox, would have excited no surprise in an orbit with a greater perihelion distance.

In the meanwhile, the parabolic orbit, which seems to represent best all the observations, is the following:—

Perihelion Passage, Feb. 27-5643.

Perihelion Distance	0.00538
Long. of the Perihelion	277° 52' 35"
Long. of the Node	354 48 50
Inclination	35 56 55

Motion retrograde.

M. Capocci thinks it probable, however, that the comet really moves in an elliptic orbit, and that it has appeared several times previously. He thinks it exceedingly probable that the comets of 1618, 1668, and 1702 were identical with the one in question, and that that of 1689 was still more clearly so, a probability which has not suggested itself to any one on account of the orbit of that comet inserted in the catalogue, calculated by Pingré, not being correct. But M. Capocci has found that, supposing the day of the perihelion passage in the year 1689 to have been December 3, the old observations of that comet are sufficiently well represented by the elements of the present one. The physical characters of the comet coincide also perfectly with those of the present one. Now this new and undeniable recognition, observes M. Capocci, curiously modifies the supposed period; and to make it satisfy all the returns, of which we have an account, it is perhaps necessary to reduce it to one of seven years nearly. He does not deny the difficulty of explaining how it has happened that the comet has not been seen at its nineteen former returns; but he contends that it is less difficult to do this than to account for the strange coincidence in the positions and in the physical appearances of the four comets above mentioned. The following is the whole series of the apparitions which may possibly belong to this one and the same body:—

1618, 1652, 1668, 1689, 1702, 1723, 1758, 1843.

Without laying very great stress on this coincidence, he thinks it proper to draw the attention of other astronomers to it, to the end that each, deducing a corresponding ellipse from his own observations, may either confirm or destroy the hypothesis; a circumstance so much the more important, as each may cherish the reasonable hope of seeing with his own eyes, within the space of seven years, the prediction verified.

The following is an abstract of a notice of the comet from a Madras paper received by the Astronomer Royal :—

“ The comet was first seen on the 2d of March, but the only part seen above the horizon was part of the tail, and that faintly.

“ On the 3d and 4th the nucleus was distinctly visible to the naked eye: the tail was divided into two distinct branches, the one long, but faint, the other much shorter, but broader and much brighter.

“ On the 5th the tails had apparently united; but, on a careful examination, a less luminous band was detected between them.

“ On the 6th several stars were visible through the tail, which near the star τ *Ceti* was about 40' in breadth. At this part it appeared through the telescope to consist of three luminous bands; the one next to the sun being broad and bright, the other two fainter and more narrow towards the nucleus. These bands were less distinct, and not more than a single separation could be detected. The nucleus appeared like a star of the fourth or fifth magnitude; its light was pale, and it was surrounded by a luminous halo of no great extent.”

14. Observations of the Comet made at the Observatory of Trevandrum, accompanied by a Drawing. By J. Caldecott, Esq. Director of the Observatory.

The observations were made with an achromatic telescope of $7\frac{1}{2}$ feet focal length and 5 inches aperture, made by Dollond for the Observatory. It is mounted equatorially on exactly the same plan as Mr. Bishop's instrument, the ends of the polar axis (which is of brass) being supported on pillars of granite. The micrometer made use of is a reticulated diaphragm of gold wire. The instrument keeps its adjustments very permanently, and the place of a known star (after correction for collimation and index error) seldom differs more than a second of time in right ascension, and 15" to 20" in declination.

The right ascensions and declinations of the comet are those read from the circles, after being corrected for instrumental errors, and for the effects of refraction, the instrumental corrections having been obtained almost every evening by observations of θ *Ceti*, when at nearly the same hour-angle as the comet was observed afterwards. In addition, differential observations of small stars passing through the field within a few minutes before or after the comet have been obtained, and the results will be communicated after the places of the stars have been determined by meridional observations.

The following is Mr. Caldecott's account of the observations :—

Places of the Comet.

Trevandrum Observatory, Lat. $8^{\circ} 30' 32''$ N.; Long. $5^h 7^m 59^s$ East.

Date.	Trevandrum Mean Time.	Observed Right Ascension.	Observed North P. D.	Remarks.
1843, March 6	^h ^m ^s 7 4 35.30	^h ^m ^s 0 33 56.4	$101^{\circ} 58' 0''$	The N. P. D. is probably erroneous this evening on account of interrup- tion from visitors. The corrections obtained from β Ceti.
7	Observations	prevented by	clouds.	
8	6 54 30.81	1 0 45.0	102 7 22	
9	6 48 27.13	1 13 48.7	102 0 44	Ditto from δ Ceti.
10	6 50 47.96	1 26 22.1	101 51 37	
11	6 43 53.35	1 38 19.4	101 41 47	Ditto ditto.
12	Observations	prevented by	clouds and rain	
13	7 5 57.15	2 0 31.2	101 15 20	Ditto ditto.
14	6 53 36.38	2 10 37.8	101 0 6	Ditto ditto.
15	7 13 2.85	2 20 21.3	100 43 22	Ditto ditto.
16	6 45 57.44	2 29 20.6	100 27 4	Ditto ditto.
17	6 45 19.51	2 37 57.0	100 9 48	Ditto ditto.
18	6 59 30.01	2 46 11.7	99 52 2	Ditto ditto.
19	7 11 56.56	2 53 59.7	99 34 43	Ditto ditto.
20	Not observed	on account of	clouds.	

Notes.

The comet was first seen (partially only) on the 4th March, about half-past six P.M.; but clouds over the head of it, which was besides very near the horizon, prevented any observations.

On the 5th, a larger portion of the tail was visible, and it was evidently higher than the evening before; clouds, however, again hung over the head until it set.

On the 6th, the sky was free from clouds, and the comet presented a most magnificent appearance. Observations of it in R. A. and N. P. D. were obtained this evening with the equatoreal; but from the excitement at first view of so splendid an object, together with the confusion caused by a number of visitors at the observatory, I do not consider them entitled to much confidence, especially those in N. P. D. The length of the tail I measured roughly with a sextant, by bringing down the image of a star which happened to be situated near the faint end of it, into contact with the head, and made it to be about 36° ; but from a much better measurement made in the same way on the 13th, this was probably too small. The nucleus of the head (seen through the $7\frac{1}{2}$ -feet telescope) presented rather a well defined planet-like disc, the diameter of which I estimated to be about $12''$, and that of the nebulosity surrounding it at about $45''$. The tail had a dark appearance along its axis, as if hollow; and at about half way from the head, it even appeared to separate slightly into two parts, the upper one being rather longer than the other.

On the 13th, after the observations for position, I introduced a parallel wire micrometer, with a view to measure the diameter of the bright part, or disc, of the head, and, by a pretty fair measure, made it to be $11''$. The nebulosity about it I estimated to be about four times the diameter of the bright part. The length of the tail, measured carefully with a sextant, I found to be 45° ; its

breadth, at one-third its length from the head, 33', and at two-thirds its length, 60'.

Since the 19th, the weather has been unfavourable, and no observations have been obtainable. The comet appears to be getting somewhat fainter than it was on the evenings of the 6th and 8th, but only slightly and very slowly so.

JOHN CALDECOTT.

Trevandrum Observatory,

March 22, 1843.

A second letter has been received from Mr. Caldecott, dated April 21, giving the following additional observation :—

March 26 $7^{\text{h}} 3^{\text{m}} 35^{\text{s}}$ Trev. M. T. R. A. = $3^{\text{h}} 38^{\text{m}} 7^{\text{s}}$ N. P. D. = $97^{\circ} 39' 12''$

From the observations of the 8th, 13th, and 18th of March, Mr. Caldecott computed the parabolic elements, which are as follow :—

Long. of the Ascending Node.....	$3^{\circ} 7'$
Inclination	$35^{\circ} 3'$
Long. of the Perihelion	$279^{\circ} 6'$
Perihelion Distance	0.0048

Time of Perihelion Passage, Feb. 27.654, Trevandrum mean time.

Motion retrograde.

15. Letter from Professor Kendall, containing Observations of the Comet made at Philadelphia. Communicated by Lieutenant-Colonel Sabine.

Philadelphia, April 27th, 1843.

Sir,—I send you the result of the observations of the great comet of February 1843, made by Mr. Walker and myself, with the Fraunhofer equatoreal, at the Observatory of the Central High School, latitude $39^{\circ} 57' 8''$, longitude $5^{\text{h}} 0^{\text{m}} 41^{\text{s}}.9$ west of Greenwich. The measures were all made with the Fraunhofer filarmicrometer, power 75, except on the 9th and 10th of April, when the extreme faintness of the comet compelled us to use the ring-micrometer. We first saw the nucleus on the 11th of March, and brought the comet to the centre of the field, and read the graduations. The place given on that evening is liable to an error of two minutes of space. That of the 10th of April is liable to an error of about one minute of space. Those of the other evenings were the result of satisfactory measures. The nucleus, on the 11th of March, was near the star ζ *Ceti*, of the third magnitude, and was of about the same brightness. The tail extended between *Rigel* and *Sirius*, about 1° south of its position on the 18th, when we saw it and also the nucleus, but made no measures. In the comet-searcher, the nucleus appeared on the 11th, with a well-defined disc, larger than that of *Jupiter* in the same instrument. In the 9-foot equatoreal, it had no appearance of a disc, but only of a nebulosity gradually condensed toward the centre; so that it was impossible to distinguish any nucleus. I have no doubt that this comet was seen in the day-time, on the 28th of February and

the 1st of March. The particulars are stated at length in Professor Silliman's Journal. An observer at Woodstock, Vermont, saw the nucleus and tail in a good telescope, probably a $3\frac{1}{2}$ -feet Dollond. Mr. Clark of Portland-Maine, a teacher of navigation, measured its distance from the sun's limb at the time of culmination, and found it to be $6^{\circ} 15\frac{1}{4}'$. Professor Loomis, of Western Reserve College, Hudson, Ohio, has computed the intensity of the comet's light on the 28th of February, and finds it to have been 24 times brighter than on the 11th of March; that is, 24 times brighter than a star of the third magnitude.

Mean Time, Philadelphia.	Star of Comparison and Magnitude.	No. of Measures.	Comet's observed R. A. corrected for Parallax, but not for Aberration.	No. of Measures.	Comet's observed Dec. corrected for Parallax, but not for Aberration.
1843. March 11 7 21 20.79			^{h m s} 1 43 35.00		$-11^{\circ} 35' 23''$ 00
19 7 25 55.68	*b, 7.8	2	2 57 14.46	2	— 9 26 50.44
	*c, 9.10			1	— 9 26 53.02
22 7 46 48.46	*h, 8.9	7	3 17 44.47	2	— 8 35 58.55
23 7 39 59.79	*i, 8	14	3 23 50.21	3	— 8 19 13.16
24 7 26 51.79	*k, 8.9	4	3 29 36.44	2	— 8 3 35.48
	*l, 8.9	4	36.61	1	40.35
	*m, 8	4	36.74	1	54.90
26 7 36 10.32	*n, 8.9	5	3 40 28.93	1	— 7 32 27.12
	*o, 8	5	29.59	1	— 7 32 17.14
April 1 7 0 20.88	*s, 9	8	4 7 54.53		
	*t, 8.9	6	54.68		
2 7 48 6.35	*u, 9	8	4 11 50.91	2	— 5 58 46.84
7 7 52 10.20	*v, 8	4	4 29 33.93		
	*y, 8	4	33.93		
	*z, 9	4	33.44		
9 7 57 59.64	*A, 9	7	4 35 52.21	7	— 4 45 38.29
10 8 21 46.25	*A, 9	1	4 39 1.00	1	— 4 36 38.00

Apparent places of the Stars compared above with the Comet.

Name.	Right Ascension.	Declination.
	^h ^m ^s	[°] ['] ^{''}
<i>b</i>	2 57 37.68	-9 33' 31".84
<i>c</i>	2 57 47.57	-9 27 27.04
<i>h</i>	3 19 17.08	-8 32 6.08
<i>i</i>	3 24 25.03	8 22 38.02
<i>k</i>	3 30 12.86	8 10 56.86
<i>l</i>	3 30 17.24	8 10 4.51
<i>m</i>	3 30 31.57	8 0 13.08
<i>n</i>	3 40 9.48	7 29 53.63
<i>o</i>	3 41 8.18	7 30 2.58
<i>s</i>	4 8 15.74	
<i>t</i>	4 8 57.61	
<i>u</i>	4 13 21.22	5 56 13.37
<i>v</i>	4 27 36.41	5 3 46.09
<i>y</i>	4 31 21.13	5 7 25.53
<i>z</i>	4 31 24.05	5 0 48.52
A	4 36 4.31	4 35 56.58

From the observations of the 19th and 26th of March, and 2d of April, we have computed the following elements:

Perihelion Passage, February 27.436953, Greenwich mean time.

Longitude of the Ascending Node $1^{\circ}55'18''.6$ from mean equinox of March 26.

Longitude of the Perihelion ... 277 43 53.7

Inclination..... 35 34 0.8

Perihelion Distance 0.00701906 $\log. q = 7.8462789$

Motion retrograde.

The ephemeris computed from these elements, after applying aberration, requires the following corrections in order to agree with our observations:

	Corr. in A.R. $\frac{1}{15} \Delta \alpha.$	Corr. in Decl. $\Delta \delta.$
March 19	- 0.33	+ 38.3
22	- 1.19	+ 5.0
23	- 1.38	+ 27.5
24	- 0.94	+ 1.8
26	- 2.07	+ 23.9
April 1	+ 1.99	
2	+ 4.50	- 21.6
7	+ 7.82	
9	+ 9.25	- 54.1

This corresponds well enough with the observations to be used in computing the parallax and aberration, and in reducing to a common date the places observed during the same half hour. These elements have some resemblance to those of the comet of 1689 as computed by Pingré. The inclination, however, of the latter, $69^{\circ} 17'$ differs too much to be consistent with their identity. Professor Benjamin Pierce, of Harvard University, Cambridge, Mass., has recomputed the observations used by Pingré, and finds for the elements of the comet of 1689,

Perihelion Passage 1689, December 2^{d} .1403 Greenwich mean time.

Longitude Ascending Node	$344^{\circ} 18'$
Longitude Perihelion.....	$271^{\circ} 16'$
Inclination	$30^{\circ} 25'$
Perihelion Distance	0.0103
Motion retrograde.	

The elements of the comet of 1843, with a period from 1689, December 2^{d} .1403, to 1843, February 27^{d} .4370, represent the places given by Pingré within 5° . Whether the errors of Pingré's places of the comet of 1689, together with the effect of perturbations, amount to 5° , is a subject worthy of investigation. It has never happened, I believe, that two comets have appeared with elements agreeing so well, without being found in the end to be the same.

Respectfully,

Lieut.-Colonel Sabine, R.A., Woolwich.

E. O. KENDALL.

16. Observations of Distance of the Comet from known stars, made at Demerara by Captain Geale of the ship *Isabella*, Lieut. A. S. Glascott, R.N., and James Donald, Esq. Communicated by Sir John Herschel.

March 11 at $7^{\text{h}} 20^{\text{m}}$ M.T.	Distance of comet from	Rigel.....	= $50^{\circ} 23'$
		Sirius ...	= $71^{\circ} 21'$
	Length of tail 46° .	Capella ...	= $77^{\circ} 30'$
		Canopus ...	= $68^{\circ} 23'$
March 12 at $7^{\text{h}} 22^{\text{m}}$	Distance from	Rigel.....	= $47^{\circ} 24'$
		Sirius ...	= $69^{\circ} 0'$
		Aldebaran =	$46^{\circ} 40'$
		Canopus ...	= $67^{\circ} 11'$
		Capella ...	= $71^{\circ} 55'$
March 13 at $7^{\text{h}} 5^{\text{m}}$	Distance from	Canopus ...	= $65^{\circ} 1'$
		Capella ...	= $70^{\circ} 13'$
		Sirius ...	= $66^{\circ} 36'$
		Aldebaran =	$43^{\circ} 30'$
March 19 at $7^{\text{h}} 15^{\text{m}}$	Distance from	Capella ...	= $62^{\circ} 24'$
		Sirius ...	= $54^{\circ} 14'$
	Length of tail 42° .	Canopus ...	= $59^{\circ} 17'$
		Rigel.....	= $32^{\circ} 6'$
March 26 at $7^{\text{h}} 10^{\text{m}}$	Distance from	Sirius ...	= $44^{\circ} 10'$
		Capella ...	= $56^{\circ} 55'$
	Length of tail 32° .	Canopus ...	= $55^{\circ} 46'$
		Rigel.....	= $21^{\circ} 35'$

March 27 at 7 ^h 12 ^m	Distance from	{	Sirius ... = 43° 8'
			Rigel = 20 30
			Canopus = 55 37
			Capella ... = 56 28
	Length of tail 30°.		
March 31 at 7 35	Distance from	{	Canopus = 53 28
			Sirius ... = 58 31
			Capella ... = 54 41
			Aldebaran = 23 30
	Length of tail 24°.		

17. Some Account of the Comet in a Letter from J. Gimblett, Esq. Communicated by Sir John Herschel.

18. Extract of a Letter from Lieut.-Colonel Harvey, 14th Light Dragoons, dated Poona, March 13. Communicated by Professor Narrien.

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